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NOTES ON GEOGRAPHIC DISTRIBUTION

Craspedacusta cf. *sowerbii* Lankester, 1880 (Cnidaria: Hydrozoa: Limnomedusae): New record for the middle plateau region of the state of Rio Grande do Sul, Brazil

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ABSTRACT: This study reports a new record of *Craspedacusta* cf. *sowerbii* for the Municipality of Passo Fundo, located in the central plateau region of the State of Rio Grande do Sul. The *C.* cf. *sowerbii* specimens were collected in May 2010 in an artificial lake formed by the flooding of a former basaltic quarry. The lake is 665 m above sea level and its surface area measures around 25.000 m^2. Its crystalline water is linked by the Miranda creek to the Passo Fundo River, part of the Uruguay River basin.

Craspedacusta sowerbii is a freshwater hydrozoan species commonly observed in the medusa stage. The species bloom sazonally in lakes, rivers, reservoirs and in natural and artificial ponds, having mainly a subtropical to temperate distribution (Acker and Muscat 1976; Jankowski 2001; Jankowski *et al*. 2008; Jakovčev-Todorović *et al*. 2010; Schwarzbold *et al*. 2010; Gasith *et al*. 2011). A small polyp present in its life cycle can remain undetectable for years before a medusa "bloom". Regarding dispersion, it is less likely the short-lived medusa stage but the minute polyp carried on aquatic plants, or any of the asexual reproductive phases such as frustules that play the role as a dispersive stage (Dejdar 1934; Reisinger 1957).

The genus *Craspedacusta* (Olindiidae) was erected by Lankester (1880) for *C. sowerbii* discovered in a artificial lake at the Kew Gardens in London (Zhang *et al*. 2009) Although some controversy does exist, the origin of the species has been since then attributed to the Yangtze River basin in China, from where numerous species and subspecies of *Craspedacusta* have been described. After its description, the presence of *C. sowerbii* has been registered in all continents, except Antarctica (Silva and Roche 2007; Jankowski *et al*. 2008). However, Zhang *et al*. (2009) found three valid species for China after phylogenetic analysis based on DNA technology (*C. sowerbii*, *C. sinensis* and *C. kiatingi*), but the authors considered the morphological characters of these species inconsistent with their results. On the other hand, Fritz *et al*. (2009) found the German populations of *Craspedacusta* spp. more related genetically to *C. kiatingi* than to *C. sowerbii*. So, in order to avoid misidentifications on the species, we named the species found in Rio Grande do Sul as *C.* cf. *sowerbii*.

In South America, the species has been reported in Argentina, Chile, Venezuela and Brazil (Schlenz 1981). In the later, information about eight preterit occurrences in the states of Goiás, Tocantins, Mato Grosso do Sul, São Paulo, Rio de Janeiro, Minas Gerais, Paraná and Rio Grande do Sul are summarized in Silva and Roche (2007). Recently, Schwarzbold *et al*. (2010) published the second occurrence for the State of Rio Grande do Sul and, Souza and Ladeira (2011) for the State of Minas Gerais.

Gliesh (1930) recorded the presence of polyps and medusae of *C.* cf. *sowerbii*, (cited as *Microhydra spec.*) in an aquarium at the Universidade Federal do Rio Grande do Sul. Schwarzbold *et al*. (2010) recorded a *C.* cf. *sowerbii* "bloom" for Rio Grande do Sul, in the reservoir of the Quatorze de Julho Hydroelectric Power Plant, in das Antas River, municipality of Cotiporã, between May and July 2009.

Craspedacusta cf. *sowerbii* is considered an exotic species in Brazil and its presence in the country is poorly documented. Ecological data are still scarce (Silva and Roche 2007; Schwarzbold *et al*. 2010). Thus, this report of a new record of the species in southern Brazil is important in order to establish geographical distribution, dispersion capacity and introduction records more accurate.

The specimens of *C.* cf. *sowerbii* (Figure 1) were collected by two of the authors (MS and SL) in May 29 2010, in an artificial lake formed by the flooding of a former basaltic quarry (28°13'43" S, 52°21'40" W; Figure 2), in the municipality of Passo Fundo, State of Rio Grande do Sul. The lake is 665 m above sea level and its surface area measures around 25.000 m^2. Its crystalline waters are linked by the Miranda creek to the Passo Fundo River, which, in its turn, is part of the Uruguay River basin.

The medusae were collected with a cup from the water surface by the shore, and were preserved in 4% formaldehyde solution. Five specimens were deposited in the Cnidaria collection of the Museu de Zoologia da Universidade de São Paulo (MZUSP, number 001763), and other five, in the Cnidaria collection of the Departamento de Zoologia da Universidade Federal do Paraná (DZoo-CN, number 000234).

According to Bouillon *et al*. (2006), the species' classification is:

Phylum Cnidaria
Superclass Hydrozoa
Class Hydroidomedusa

Subclass Limnomedusae
Family Olindiidae
Craspedacusta cf. *sowerbii* Lankester, 1880

The morphology of the specimens agrees with the diagnosis of Jankowski (2001) and Bouillon *et al*. (2006), which is resumed as follow: statocysts produced into a long centripetal canal, passing through the thickness of the velum and ending blindly near its margin (this character is diagnostic for the genus *Craspedacusta*); evenly distributed marginal tentacles, all of one kind; tentacle base usually with a parenchymatic endodermal core embedded in umbrellar mesoglea and with nematocysts in groups on papillae; well-developed marginal cnidocyst ring; four simple radial canals, no centripetal canals; hanging, pouch-like "gonads" only on radial canals; no gastric peduncle; no adhesive organs.

The prominent size of the four perradial tentacles is a constant feature in *C.* cf. *sowerbii* from all parts of the world (Kramp 1950). The marginal tentacles seem all of one kind, but in our formalin preserved specimens they are not of the same size (Figure 1). The size of the medusae varied from 8.1 to 11.5 mm.

Craspedacusta cf. *sowerbii* shows a worldwide distribution, probably due to its several forms of vegetative reproduction and ability to survive in adverse conditions (Acker and Muscat 1976; Bouillon and Boero 2000; Fritz *et al*. 2007).

During the sample procedure, there was a large amount of medusae swimming near the water surface of the artificial pond. The water was transparent, with a temperature of 22°C. The same swimming behavior near the surface has been observed by Schwarzbold *et al*. (2010), by Silva and Roche (2007) in a natural calcareous lagoon in Mato Grosso do Sul, and by Souza and Ladeira (2011) in an artificial calcareous pond in Minas Gerais. Schwarzbold *et al*. (2010) also found *C.* cf. *sowerbii* medusae in crystalline waters but, in contrast, Silva and Roche (2007) reported that their collection date (April 2006) was at the end of the rainy season, so the water was turbid due to elevated levels of suspended material carried from the surrounding area.

The occurrence of *C.* cf. *sowerbii* medusae in the central plateau region of Rio Grande do Sul, in addition to that of Schwarzbold *et al*. (2010) in relatively close period and location (Figure 3), constitute an unprecedented data of the species in Brazil. Two occurrences have also been recorded in Belo Horizonte, State of Minas Gerais, but separated by 60 years (Martins 1941; Souza and Ladeira 2011). Although these two records to the State of Rio Grande do Sul

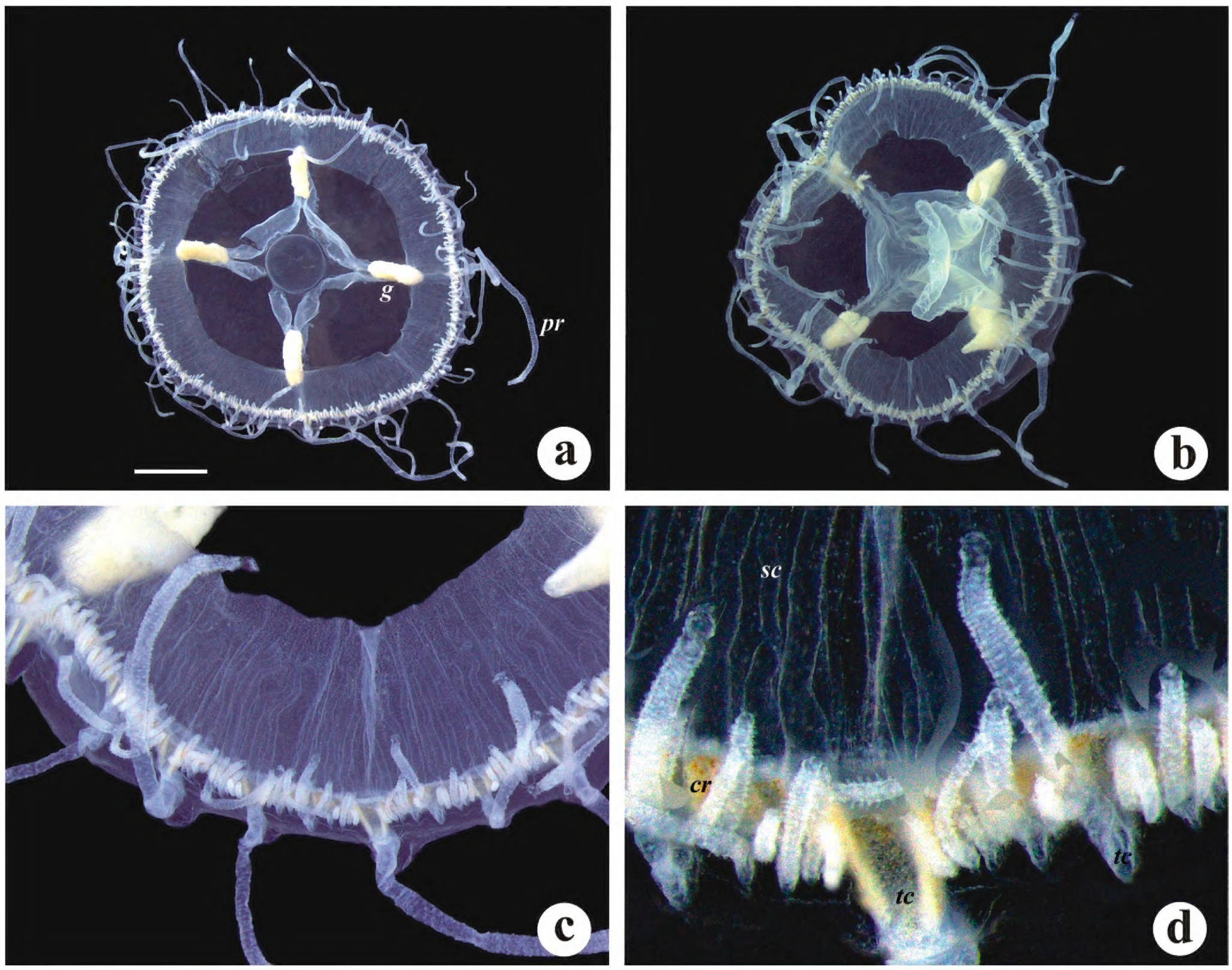

Figure 1. Medusae of *Craspedacusta* cf. *sowerbii* from a former basaltic quarry flooded (municipality of Passo Fundo, State of Rio Grande do Sul). (a) medusa in aboral view, Scale: 2 mm ; (b) medusa in oral view; (c) detail of medusa margin; (d) margin and velum detail. *pr* = perradial tentacle; *sc* = statocysts centripetal canals in the velum; *tc* = endodermal core of tentacle base; *cr* = cnidocyst ring; g = gonad on radial canal.

come from the same geographic region, the ponds where the medusae appeared belong to distinct hydrographic basins. The artificial lake referred in this study is linked to the Uruguay River basin, at the Northwest side of the plateau, while the Quatorze de Julho Reservoir, where the specimens mentioned by Schwarzbold *et al.* (2010) were found, is linked to the Jacuí River basin, part of the eastern Lagoa dos Patos hydrographic system. This geographic separation may be a relevant data to future studies on the history of *C.* cf. *sowerbii* distribution, dispersion and introduction in the state or in the area encompassed by the basins, like that of Fritz *et al.* (2007; 2009), where they detailed the population dynamics of the species within its distributional area in Germany. We also hope that this registration may contribute to future analysis of taxonomy and distribution of the *Craspedacusta* species complex in continental water of the Brazilian territory.

Figure 2. Partial view of the lake where *Craspedacusta* cf. *sowerbii* were found in the municipality of Passo Fundo, State of Rio Grande do Sul, Brazil.

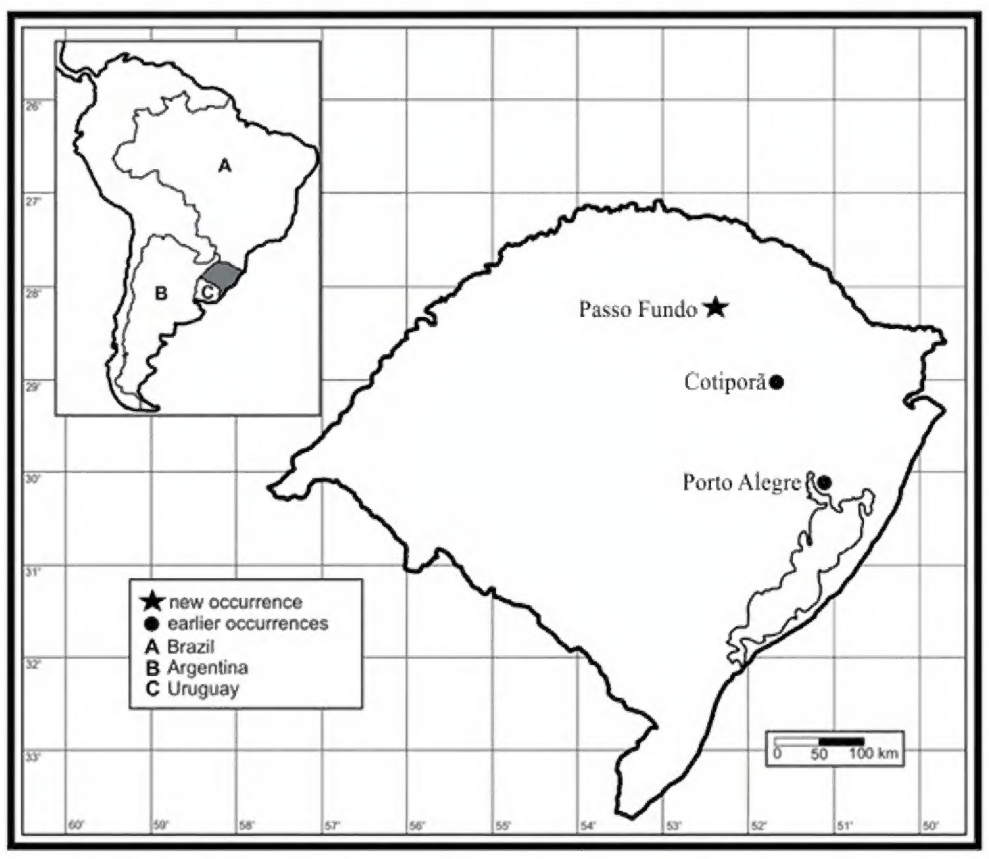

Figure 3. Map showing the occurrences of *Craspedacusta* cf. *sowerbii* in the State of Rio Grande do Sul.

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